Set	Items	Description
S1	552	OFFSET (S) PRICE? (S) APPLIANCE?
S2	283228	(ELECTRICITY OR POWER OR ENERGY OR UTILITY) (S) PROVIDER?
S3	19	S1 AND S2
S4	82	COMPENSATION (S) PURCHAS??? (S) APPLIANCE?
S5	14	S2 AND S4
S6	12	S5 NOT S3
S7	14894	BRAND (S) NAME? (S) DISCOUNT?
S8	0	S7 AND S4
S9	4	S7 AND S1

?

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Errors
1	BRS	L1	18	(time same purchas$3 same mode same select$5) and ((sav$3 or econom$4) with (mode or setting$1))	USPAT; US-PGPUB; EPO	2003/06/27 18:38			0
2	BRS	L2	10	(time same purchas$3 same mode same select$5) and ((sav$3 or econom$4) with (mode or setting$1))	USPAT; EPO	2003/06/27 18:49			0
3	BRS	L3	0	2 and (security or crime)	USPAT; EPO	2003/06/27 18:42			0
4	BRS	L4	15	(time same purchas$3 same mode same set$4) and ((sav$3 or econom$4) with (mode or setting$1))	USPAT; EPO	2003/06/27 18:53		Truncation overflo	1
5	BRS	L5	7	4 not 2	USPAT; EPO	2003/06/27 18:50			0
6	BRS	L6	1	(time with purchas$3) same set$4 same ((sav$3 or econom$4) with mode)	USPAT; EPO	2003/06/27 18:58			0
7	BRS	L8	6	(time near3 purchas$3) same (set or setting$1) same (saving or economy or economical)	USPAT; EPO	2003/06/27 19:06			0
8	BRS	L7	49	(time with purchas$3) same set$4 same (sav$3 or econom$4)	USPAT; EPO	2003/06/27 19:02		Truncation overflo	1
9	BRS	L9	1	(time near2 purchas$3) same (select$1 or selectable) same (saving or economy or economical)	USPAT; EPO	2003/06/27 19:05			0
10	BRS	L10	0	(time near3 purchas$3) same (set or setting$1) same (power near3 mode)	USPAT; EPO	2003/06/27 19:06			0
11	BRS	L11	391	(time near3 purchas$3) same (set or setting$1)	USPAT; EPO	2003/06/27 19:07			0
12	BRS	L12	4	(time near3 purchas$3) same (set or setting$1) same appliance$1	USPAT; EPO	2003/06/27 19:09			0
13	BRS	L13	3505	(power with mode) same (saving or economy or save)	USPAT; EPO	2003/06/27 19:10			0
14	BRS	L14	3	11 and 13	USPAT; EPO	2003/06/27 19:12			0
15	BRS	L15	111	(low near3 power) and (time near2 purchase)	USPAT; EPO	2003/06/27 19:16			0

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Errors
16	BRS	L16	6	15 and appliance$1	USPAT; EPO	2003/06/27 19:20			0
17	BRS	L17	39	(low near3 power) and 11	USPAT; EPO	2003/06/27 19:16			0
18	BRS	L18	37	17 not 16	USPAT; EPO	2003/06/27 19:16			0
19	BRS	L19	33	11 and appliance$1	USPAT; EPO	2003/06/27 19:20			0
20	BRS	L20	25	19 not 17	USPAT; EPO	2003/06/27 19:20			0

Set Items Description

S1 0 (TIME (W) PURCHASE) (S) SET???? (S) ((MODE (W) OPERATION))

S2 789 (TIME (S) PURCHASE) (S) MODE (S) OPERAT???

S3 2399 APPLIANCE? AND (UTILITY (S) PROVIDER?)

S4 0 S2 AND S3

S5 150551 SAV??? (S) POWER

S6 52 S2 AND S5

?

T S6/9/41

6/9/41 (Item 5 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

00822342 **Image available**

ADVANCED METERING SYSTEM ENABLING REGULATION AND BILLING OF UTILITIES BY THIRD PARTY INTERAGENT

SYSTEME DE COMPTAGE AVANCE PERMETTANT LA REGULATION ET LA FACTURATION DE SERVICES PAR UN INTERAGENT TIERS

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English Abstract

A power metering apparatus provides utility services to a customer's facility when the customer prepays or makes other sufficient advance payment assurances. This apparatus is inserted between the utility company's delivery lines and the customer's facility. A utility service interagent establishes an account with a utility supplier for the provision of utility services to the customer's facility, with responsibility for payment and/or provision of utility services lying with the power interagent. When the customer desires utility services,

the customer submits prepayment by various means, such as (1) purchasing

a payment card and locally presenting the card to the metering apparatus,

or (2) providing prepayment or other payment assurances to the interagent

via telephone, cable, internet, or another means, in which case the

interagent sends machine-readable payment notification to the metering

apparatus via telephone, cable connection, etc. Ultimately, the metering

apparatus selectively enables the delivery of utility services to the

customer's facility depending upon whether the customer has made adequate

prepayments.

French Abstract

Un appareil de comptage de courant fournit des services publics a

l'installation d'un client lorsque le client prepaye ou donne d'autres

assurances suffisantes de paiement a l'avance. Cet appareil est insere

entre les lignes de distribution de la compagnie du services publics et

l'installation du client. Un interagent de services publics etablit un

compte avec un fournisseur de services pour la fourniture de services

publics a l'installation du client, avec une responsabilite de paiement

et/ou de fourniture de services publics aupres de l'interagent mandate.

Lorsque le client demande des services publics, il soumet un prepaiement

par divers moyens tels que (1) l'achat d'une carte a prepaiement et la

presentation localement de la carte dans l'appareil de comptage ou (2) la

fourniture d'un prepaiement ou d'autres assurances de paiement a

l'interagent par telephone, cable, l'Internet ou d'autres moyens, auquel

cas l'interagent envoie une notification de paiement lisible par machine

a l'appareil de comptage par telephone, connexion par cable, etc. Enfin,

l'appareil de comptage permet la distribution selective de services

publics a l'installation du client, selon que le client a procede aux

prepaiements adequats.

Legal Status (Type, Date, Text)

Publication 20010802 A1 With international search report.

Publication 20010802 A1 Before the expiration of the time limit for

amending the claims and to be republished in the

event of the receipt of amendments.

Detailed Description

- before the expiration of the time limit for amending the For two-letter

codes and other abbreviations, refer to the "Guid

Claim

amendments ning of each regular issue of the PCT Gazette.

ADVANCED METERING SYSTEM ENABLING REGULATION

AND BILLING OF UTILITIES BY THIRD PARTY INTERAGENT

TECHNICAL FIELD

The present invention relates to the provision and billing of utility

services to customers'residential and commercial facilities. More

particularly, the invention concerns a system for providing utility

services such as electrical power, and billing them to customers

independent of the normal utility provider.

BACKGROUND ART

Electrical power is produced by a variety of different means today. In addition to nuclear and hydroelectric generators, many power plants employ boilers and steam turbine generators powered by hydrocarbons such as natural gas, oil, and the like. Power plants are operated by electricity generation companies, also known as "electricity service providers." This raw electrical power is commonly processed by transformers to increase its voltage, for transmission purposes. Then, an "electric power transmission company" transmits the electricity over various long distances using large power distribution circuits supported by appropriate towers, poles, and other suspension means. This process is commonly called "wheeling." Electricity ultimately passes to a switchyard, which in turn passes the electricity to a local substation. At the substation, and then at local transformers near where electricity will be used, the electricity is lowered to a safe voltage for homes and businesses, such as two-hundred-twenty volts and one-hundred-ten volts and then delivered to the customer. Regardless of which electricity service provider originally generated the power, electricity flows from the substation to the customer under control of an "electricity distribution company" who typically owns the local power lines and distribution equipment.

At a customer's premises, there is an electricity meter, which measures power utilization in appropriate units cwch as kilowatts. The meter is

interposed between transmission lines emanating from the local substation's distribution transformer and a circuit "breaker box" where electricity first enters the customer's premises. Field employees of the electricity distribution company periodically read the local meters, which measure power in suitable units such as kilowatt-hours. Ultimately, these readings are used to generate the customers' electricity bills.

The foregoing arrangement has been used successfully for some time, and enjoys considerable, widespread success. Accordingly, this power distribution scheme is likely to continue for years to come. Nonetheless, the present inventor has reassessed this arrangement with an eye toward uncovering any limitations and making appropriate improvements. In this respect, the present inventor has recognized that this arrangement may not be particularly well suited to certain 1 0 users, such as residential customers of lower incomes, for the following reasons. First, a customer with weak credit references might have difficulty initially establishing an account with the electricity distribution company. Furthermore, it may be difficult or even impossible for the customer to establish an account if the customer has previously had power turned off due to nonpayment.

For customers without electrical power, there may be numerous undesirable, unsafe, or even dangerous results, such as the unavailability of heat during cold winter months, inability to properly refrigerate perishable foods, and lack of lighting sufficient to prevent

crime and navigate through dark households. If the customer can ultimately overcome the financial hurdles, there is the additional potential inconvenience of having to wait several days for a field employee of the electricity distribution company to arrive at the customer's residence and turn on the power. Consequently, due to the previously discussed situations along with other unsolved problems, the known arrangement for providing and billing for electrical power is not completely adequate for all customers.

DISCLOSURE OF INVENTION

Broadly, the present invention concerns a power metering apparatus with an activation feature that selectively p', :)vides power to a residential or commercial electrical facility depending upon whether the customer has made prepayment or other sufficient arrangements to purchase electricity.

The power metering apparatus is inserted between an electricity distribution company's meter and a suitable location of customer's electric system, such as the breaker box. An intermediate entity, called a "power interagent" or "utility interagent," makes appropriate financial and other arrangements for continued delivery of electrical power from the electricity distribution company to the customer. This may involve, for example, establishing an ongoing account with the electricity generation, transmission, and/or distribution companies for the provision

of electricity to the customer's electrical facilities, where the power interagent is responsible for payment. Whenever the customer wishes to have electric power available, the customer submits prepayments or other suitable payment assurances to the power interagent. Prepayments may be made by various means, such as (1) purchasing a magnetic, optical, or "smart" circuit card and locally presenting the card to the power metering apparatus, or (2) providing advance payment or payment assurances to the power interagent via telephone, internet, physical mail (such as U.S. Postal Service, express delivery, courier, etc.), personal delivery, e-mail, or 1 5 another suitable means. Whereupon the power interagent sends machinereadable notification of the prepayment to the metering apparatus via telephone modem, digital subscriber line ("DSL") modem, cable modem, wireless, or other conveyance means. Ultimately, the power metering apparatus activates or deactivates depending upon whether the customer has made sufficient prepayments. Although the invention contemplates customers'advance payment for power, the power interagent may accept other advance guaranty or payment arrangements that are herein referred to as "prepayment." The metering apparatus may also initiate communications to the power interagent to report power usage statistics to the power interagent.

In addition to electrical power, the present invention may also be implemented in the context of other services, such as natural gas, water,

telephone, cable television, etc. However, for ease of discussion, the example of electrical power is used throughout the present description as a brief example.

In one embodiment, the invention may be implemented to provide a method to operate a prepaid power metering system, or a method of doing business by providing electrical power to customers on a prepaid basis. In another embodiment, the invention may be implemented to provide a prepaid power metering system or similar apparatus. In yet another embodiment, the invention may be implemented to provide a signal-bearing medium. tangibly embodying a program of machine-readable instructions executable by a digital data processing apparatus to operate a prepaid power metering apparatus. Another embodiment concerns logic circuifty having multiple interconnected electrically conductive elements configured to operate a prepaid power metering apparatus. The invention affords its users a number of distinct advantages. With this invention, for example, customers can quickly obtain electrical power for their houses. Customers need not wait for the electricity distribution company to activate an account and dispatch a field employee to the customer's premises to start power. This invention utilizes remotely controllable equipment to selectively enable or disable electrical power, where this equipment is installed at the customer's house. Thus, the power interagent can immediately enable power whenever the customer makes an appropriate

prepayment for electrical power. Thus interrupted service may be restored

promptly upon payment. The invention affords customers with a number of

convenient ways to make prepayment to the power interagent. The customer

can authorize debits to a credit card or bank

account over the telephone, submit credit card payment or bank debit

authorization via e-mail or internet web site operated by the power

interagent, submit funds by wire transfer, or submit a check or credit

card payment by physical mail (such as U.S. Postal Service, express

delivery, courier, etc.), personal delivery, or another means. According

to another prepayment technique, the customer can purchase a convenient

card containing a fixed amount of "e-kilowaft

hours" or "e-funds."

Another advantage of this invention is that it enables customers with low

income or poor credit histories to easily obtain electrical power. To the

power metering apparatus of this invention, a customer's credit history

or income is irrelevant so long as the customer makes sufficient payment

arrangements, such as paying for electrical power in advance. As still

another advantage, the customer may enjoy cost savings obtk7ined by the

power interagent's wheeling of power. From the perspective of the power

interagent, a number of benefits exist as well. Forexample7 customer

payments are made by suitably reliable means such as bank account debit,

credit cards, and prepayment, thereby avoiding potential losses by

uncollected accounts receivable. Furthermore, the power interagent may

negotiate low rates on purchases from power suppliers with substantial spreads between purchase and sales prices, thereby increasing profit. The invention also provides a number of other advantages and benefits, which should be apparent from the following description of the invention.

BRIEF DESCRIPTION OF DRAWING

The objects, advantages and features of this invention will be more readily appreciated from the following detailed description, when read in conjunction with the accompanying drawing, in which:

FIGURE 1 is a block diagram of the overall hardware components and interconnections of a prepaid power metering system according to the invention. FIGURE 2 is a block diagram of the hardware components and interconnections of an exemplary payment domain according to the invention. FIGURE 3 is a block diagram of the hardware components and interconnections of a user information domain e

.cording to the invention. FIGURE 4A is a block diagram of a digital data processing machine according to the invention.

FIGURE 4B shows an exemplary signal-bearing medium according to the invention. FIGURE 5 is a flowchart of a sequence for establishing and then providing prepaid**power**service. FIGURE 6 is a flowchart of a sequence for operating the prepaid**power**metering apparatus of the invention. FIGURE 7 is a flowchart of an operational sequence for customer prepayment by local use of or payment card according to the invention. FIGURE 8 is a flowchart of an operational sequence for

customer prepayment by contacting the prepaid**power**interagent, according to the invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The nature, objectives, and advantages of the invention will become more apparent to those skilled in the art after considering the following detailed description in connection with the accompanying drawings.

HARDWARE COMPONENTS & INTERCONNECTIONS

Overall Structure

One, aspect of the invention concerns a prepaid**power**metering apparatus, which may be embodied by various hardware components and interconnections. FIGURE 1 shows one exemplary construction, in the form of the prepaid**power**metering apparatus 106. As discussed more particularly below, the apparatus 106 is embodied by various circuitry and other hardware that measures and selectively dispenses electrical **power**to a customer's residential building, commercial building, remote electrical site (such as an antenna, oil pump jack, etc.), or other "electrical facility" 109 requiring electrical**power** . The apparatus 106 derives electrical**power**from a□power□source 102 such as transmission lines of an electricity distribution company. Accordingly, the apparatus 106 is electrically interposed between the electricity distribution company's facilities and the customer's property.

As a more particular example, as shown in FIGURE 1 , the apparatus 106 may be attached between the followinj components: (1) a circuit breaker box 108 or other inlet to the customer's electrical facility 109, and (2)

the electricity distribution company's meter 104. (The meter 104, as an example, may comprise a waft-hour meter used to measure electricpower in kilowatt hours. Although the present description is made in terms of electricalpower , ordinarily skilled artisans, having the benefit of this disclosure, will recognize that this disclosure also applies to other utility services such as natural gas, water, telephone, cable television, and the like, whether measured in terms of time, consumption volume, or another property. In the case of utility services without a utility meter (such as telephone), the apparatus 106 may be inserted at a convenient and appropriate location between the customer's facility and the utility company's delivery lines, such as electrical lines, copper cable television line, water pipes, telephone lines, etc. The apparatus 106 conveys electricity from the source 102 to the customer via apower path that, as illustrated, includes a mode switch 105, input surge protector 1 1 0, frequency filter 1 1 1 ,power saver1 1 2, switch 1 1 4, local meter 1 1 61 and output surge protector 118. The switch 114 operates under direction of the controller 120 according to various input received from a payment domain 122 and user information domain 124.

Mode Switch

If desired to provide additional flexibility in use, the apparatus 106 may optionally include an externally selectable mode switch 105. The mode switch 105 includes three settings, including (1) "off," where the switch 105 preventspowersource 102 electricity from flowing to the breaker

box 108, (2) "shunt" or "flow through," where the switch 105 conducts electricity along a path 107 directly to the breaker box 108, circumventing the prepaid**power**metering apparatus 106, and (3) "metering enabled," where the mode switch 105 directs electricity through the**power**metering apparatus 106. Although the mode switch may be implemented in many different ways, FIGURE 1 illustrates one example. The illustrated mode switch 105 connects an arm 105c to a first node 105a to implement the "shunt" setting, or alternatively connects the arm 105c to a second node 105b to implement the "metering enabled" setting. When the arm 105c is not connected to either node 105a-105b, it occupies an intermediate, no-connect setting to implement the "off"setting.

The mode switch 105 provides added flexibility in operating the prepaid **power**metering apparatus 106. As an example, line employees of the electricity distribution company may manually activate the switch 105 by using a specially shaped key, swiping a magnetic security card, entering a PIN code on a keypad, remotely transmitting an activation signal, etc. Thus, the electricity distribution company line employees configure the switch 105 as follows:

1 The switch is placed in the "metering enabled" mode when the power interagent has arranged for power delivery, as explained below.

2 The switch is placed in the "shunt" mode when the customer has

arranged for power delivery, electing not to use the power

interagent's services.

3 The switch is placed in the "off"setting when the**power**interagent.

The customer fails to pay for electrical**power** .

PowerPath

As mentioned above, the apparatus 106 conveys electricity from the source

102 to the customer via the**mode**switch 105, input surge protector 1 1

0, frequency filter 1 1 1 ,**power saver**1 12, switch 1 14, local

meter 1 1 6, and output surge protector 1 1 8. The (optional) input surge

protector 1 1 0 comprises a varistor, active surge protection circuitry,

electromagnetic surge device, spark gap device, or other component(s) to

prevent damage to the apparatus 106 from transient voltage and/or

currents supplied by the**power**source 102, and also to prevent unwanted

signals from being fed back to the**power**source 102. The (optional)

frequency

filter 1 1 1 removes any communication frequency generated by the

telecommunication interface 204 from entering the**power**source 102. The

(optional)**power saver**112 comprises, singularly or in tandem, one or

more of the following: a suitable chopper, switching device, shunt,

timedomain device, frequency altering device, or other circuitry to

condition the input electric**power**for more efficient and cost-□saving□

use by the customer.

Under direction of the controller 120, the switch 114 is operable to

selectively enable or disable**power**conveyance to the customer, depending upon whether the switch is "on" or "off." As an example, the switch 1 14 may comprise a MOSFET, Triac, SCR, Diac, or another suitable component to selectively pass or block electrical**power**on the order of 20 to 200 amps and 120 volts or multiples thereof, such as 220, 440, 660 volts, etc. The local meter 116 tracks electric**power**delivered through the apparatus 106. Although the local meter 1 1 6 may be implemented in various ways, some examples include a solid state RMS**power**measurement device, digital signal processor based computation device, etc. Some suitable products are commercially sold by companies such as Schlumberger, General Electrics, Johnson Controls, Siemens, and the like.

The local meter 116 is coupled to the controller 120, enabling the controller 120 to monitor current**power**usage by the customer's electrical facility 109, and also to track the customer's usage history.

The (optional) output surge protector 1 1 8 may employ similar components as the input surge protector 1 1 0. In contrast to the input surge protector 1 1 0, the output surge protector 118 protects the customer's electrical facilities 109, from transient voltages and/or currents that may arise from components of the apparatus 106, such as the switch 1 14 or **power saver** 1 12, while also protecting the apparatus 106 from activity occurring in the electrical facilities 109.

Controller

As mentioned previously, the switch 114 is operated under direction of the controller 120. In this respect, the controller 120 may comprise a microprocessor or other data processing apparatus, logic circuit, configuration of discrete circuit elements, or other electrical component capable of supplying electrical signals to activate and deactivate the switch 1 1 4. As a specific example, the controller 120 may be implemented by a Z8 microcontroller. The controller 120 may optionally be coupled to a power storage device 128 such as a battery, capacitor, and the like, to provide backup power to the controller 120 in case a wall outlet or other primary supply (not shown) of power for the apparatus